

(19) World Intellectual Property Organization
International Bureau



PCT



(43) International Publication Date
1 June 2006 (01.06.2006)

(10) International Publication Number
WO 2006/057431 A1

(51) International Patent Classification:
H02M 3/155 (2006.01)

(74) Agent: ITOH, Tadahiko; 32nd Floor, Yebisu Garden
Place Tower, 20-3 Ebisu 4-chome, Shibuya-ku, Tokyo
1506032 (JP).

(21) International Application Number:
PCT/JP2005/022037

(22) International Filing Date:
24 November 2005 (24.11.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2004-342430 26 November 2004 (26.11.2004) JP

(71) Applicant (for all designated States except US): **RICOH
COMPANY, LTD.** [JP/JP]; 3-6, Nakamagome 1-chome,
Ohta-ku, Tokyo, 1438555 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KATOH, Tomonari**
[JP/JP]; 12-5-A-202, Kouda 4-chome, Ikeda-shi, Osaka,
5630043 (JP). **MATSUO, Masahiro** [JP/JP]; 6-9, Sakura-
gaokanishimachi 2-chome, Nishi-ku, Kobe-shi, Hyogo,
6512227 (JP).

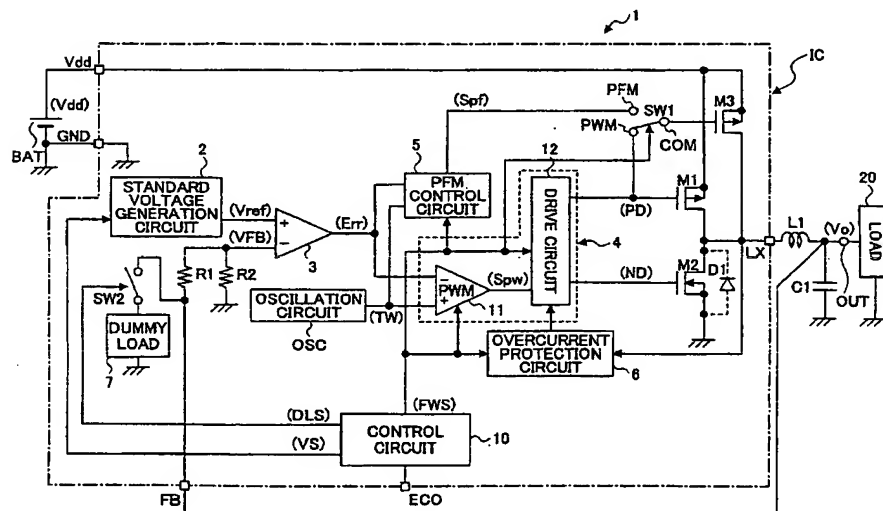
(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG,
KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY,
MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO,
NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK,
SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: SWITCHING REGULATOR AND METHOD FOR SWITCHING OUTPUT VOLTAGE THEREOF



(57) Abstract: A switching regulator converts an input voltage to a predetermined voltage and outputs the predetermined voltage to a load through an output terminal. The switching regulator includes a first switching element, a second switching element, a control switching circuit part, and a smoothing circuit. When a first operating mode in which a PFM control is performed and a voltage from the output terminal becomes a first voltage is shifted to a second operating mode in which a PWM control is performed and the voltage from the output terminal becomes a second voltage larger than the first voltage, the control switching circuit part increases the voltage from the output terminal stepwise progressively from the first voltage to the second voltage while performing the PWM control.



— with amended claims

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

